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Librarians' Perception Towards Virtual Reference Service (VRS): Innovation and Knowledge Cluster Use Case

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Abstract

Reference Service enables libraries to provide information to a person who needs it, directly or indirectly or teaching him how to find the needed information in the sources. With new technologies, users' information seeking behaviour (ISB) along with their expectations from the reference service has witnessed a sea change, which motivate the Librarians to embrace the Internet as an appropriate medium for information exchange, communication, and instruction, including both synchronous and asynchronous tools and played a pivotal role in transforming the in-person desk-based TRS to VRS. Libraries in India by-and-large have implemented ILMS (e.g. RFID) for their automation but the status of VRS adoption is scarce barring a few cases wherein libraries are providing reference service through email or web-form (asynchronous). The present study contains the Universe of sample of 20 members of the CRIKC libraries at the initial stages and later the number rose to 29. Thus the study is limited to the perception, awareness, technological feasibility and other such aspects. VRS was not being offered by almost all of the CRIKC libraries and Synchronous VRS (SVRS) was offered by none of them. The study sample was collected by conducting a questionnaire method and the analysis of the data was done quantitatively with the help of both descriptive statistics and inferential statistics using the software IBM SPSS. Response of librarians regarding types of RISS provided in their respective libraries indicates that the highest response (57.9%) for "information and referral services" was provided 'Frequently' while 15.8% provided this service 'very frequently'. 'Display of new arrivals' (94.7%) and 'quick/ready reference and other directional services' (79%) were provided regularly ('Very Frequently' and 'Frequently') by the majority of CRIKC institutional libraries. The preference of instruction based services provided by the libraries of select CRIKC institutions. It was found that the highest response (52.6%) for 'access or searching OPAC' was in 'very frequently' provided category while 31.6% provided this service 'frequently'. It was found that 'research assistance and consultation' was actively provided was frequently provided by 47.4% (9) a service. 'Readers advisory services' (57.9%) were also provided by

regularly (frequently and very frequently). Table 4.9Perception regarding various types of reference service, It indicates that more than 50% librarians pointed out that ‘quick/ready reference questions’ can be better handled by Virtual Reference Service (VRS) than TRS. Thus, in the light of the above facts the present study has been planned by the researcher as a meaningful understanding and deliberate investigation pertaining to the domain of VRS.

Keywords: Virtual Reference Service (VRS), Digital Reference Service (DRS), CRIKC, Reference Service

Introduction:

Samuel Green, in his 1876 paper titled, "Personal Relations Between Librarians and Reader," wrote, “helping users locate information is essential because the public is not trained to find information” (Bopp & Smith, 2001). Assistance to users in finding required information has become more relevant in the 21st century owing to multiplicity, magnitude and enormity of information forms and formats, especially online information. The assistance of users forms the kernel of reference service the essence of which was beautifully expressed by Padma Shri Dr. S. R. Ranganathan as the process of establishing “contact between the right reader and right book at the right time and in the right personal way” (Ranganathan, 1989). Ranganathan defines Reference Service as: “Personal Service to each reader in helping him to find the documents answering his interest at the moment pin-pointedly, exhaustively and expeditiously” (Ranganathan, 1961). According to Hutchins, “reference work includes the direct, personal aid within a library to persons in search of information for whatever purpose and also various library activities especially aimed at making the information as easily available as possible” (Hutchins, 1944). ALA Glossary states, “reference service is that phase of library work which is directly concerned with assistance to readers in securing information and in using the resources of the library in study and research” (ALA Glossary of Library and Information Science, 1983).

With new technologies, users’ information seeking behaviour (ISB) along with their expectations from the reference service has witnessed a sea change. Users of the current

generation now possess a wider range of information needs and inquiries while the sophistication with information searching has also increased tremendously. To meet such information needs and demands, libraries need to expand the scope of reference beyond using the mail, telephone, or fax machine with the help of the computer and the Internet. Technological innovation played a pivotal role in transforming the in-person desk-based traditional reference service (TRS) to VRS.

Review of Related Literature:

Literature reviews are systematic syntheses of previous work around a particular topic. A literature review is a systematic explicit and reproductive method for identifying, evaluating and interpreting the existing body of recorded work produced by researchers, scholars and practitioners (Fink, 1998). The review of the literature for this study focuses on VRS/DRS as discussed by different authors in their scholarly writings. The emphasis has been made to cover the scope, research methodology, major findings, and suggestions or recommendations put forward by the authors.

Lauer & McKinzie (2002) in their article entitled "Bad Moon Rising: A Candid Examination of Digital Reference and What It Means to the Profession" overestimated the profound impact of the digital reference claimed by its proponents. Librarians tend to overestimate technology, assume its intrinsic value in improving library operations and services, and underestimated the human factor of librarian expertise and professional skills. Overstated the impact of library trends was a cyclically recurring phenomenon and a current example was the hype surrounding digital reference. The adoption of digital reference was unlikely to be cost-effective in most libraries, nor was it useful to improve existing structures and work well. Librarians had difficult resource allocation decisions to make. The superiority of traditional reference approaches should not be overlooked by misdirected digital reference emphasis.

Zanin-Yost (2004) in his theoretical paper entitled "Digital Reference: What the Past Has Taught Us and What the Future Will Hold" discussed the evolution of DRS, working of

DRS, related issues and implications for users in academic libraries in the U.S. The author believed that adoption of new technologies brings new opportunities as-well-as challenges. However, this would not impact the core value or foundations and philosophy of reference service. Zanin argued that "reference librarians will continue need to reach out to patrons and help them find and use information." He suggested that "librarians should embrace this challenge and seek out new and improved methods to provide reference service." While visualizing the future potential of VRS, the author concluded that "Internet had changed the services of libraries by helping to reach out to the people who otherwise would never visit the library."

Sharma, Kumar and Singh (2004) in their study entitled "Digital reference is an emerging trend of traditional reference service" highlighted how VRS evolved as a default solution to cope with the emerging multifaceted technological environment. The authors discussed the concepts, elements and benefits and limitations of VRS. The study also highlighted the availability of DRS software, collaborative DRS. The authors articulated that "information professionals are required to cope up with the new technological changes, but at the same time, one should not fear that the new emerging technology-based services would replace the traditional services completely rather these were emerging as supplementary services to improve the information dissemination amongst the user community."

McClennen and Memmott (2001) in their paper entitled "Roles in Digital Reference" discussed five roles involved in the digital reference process highlighting some aspects of each role. The authors articulated that "compared to traditional desk reference, the digital environment presented novel challenges. However, it also allowed for increased efficiency by letting staff members focused on one aspect of the job at a time." The study found that the language used to discuss traditional desk reference inadequate in complex situations dealing with the users. The authors believed that the new model would pave the way for "further discussion and research about the process of digital reference and would also provide a framework upon which decisions about digital reference practice can be made." The authors argued that clearly defined policies and procedures were essential for successful VRS. Libraries should frame comprehensive policies that were well understood by users and staff

covering all necessary aspects of the service. They must be ensured that "everyone knows which roles they have been assigned to play."

Shakeri, Akbaridaryan and Mohammadi (2012) in their research article "Comparison of Traditional and Digital Reference Questions and Responses at the National Library and Archives" aimed to evaluate the characteristics of reference services users and their information needs to know how to improve these types of services at the NLAI qualitatively and quantitatively. Findings from this study indicated that the most frequently asked questions were ready reference questions (33.55 percent) at the NLAI's reference desks and that the least common questions were research-based (17.34 percent). Females (65.53percent) used traditional reference service, but males (54.55percent) used more virtual reference service. The analysis also showed that the most common and least common types of questions were ready for reference at the traditional reference desk (42.42 per question) and research questions (6.89percent) respectively and the virtual reference questions (32.28percent) and the directory questions (20.08percent). Most of the questions posed by customers of both traditional and virtual reference services could be classified in computer science, information, and general works (000) (30.58 percent) while the fewest questions were grouped in philosophy and psychology (100) (1.18 percent).

Statement of the problem:

The inferences drawn from the literature review formed the base for defining the statement of the problem (research problem) and setting of the study objectives. Libraries in India by-and-large have implemented integrated library management system (ILMS) for their automation and are taking a step ahead by extending the degree of automation by implementing Radio Frequency Identification System (RFID) for enhanced speed and convenience. The literature is also flooded with research including case studies on library automation and RFID application.

While libraries in many countries have been able to adopt digital reference service (DRS) or virtual reference service (VRS), the status of VRS adoption in the Indian context is scarce barring a few cases wherein libraries are providing reference service through email or web-

form (asynchronous). The benefits of VRS are now being well established, its high time libraries in our countries should adopt the synchronous mode of VRS for its inherited benefits. The literature revealed the paucity of cases where libraries in India are offering VRS. This gap, in theory, maybe a reflection of actual VRS implementations.

More and more library resources are now available in electronic format with users accessing e-resources online. The users heavily relying on the e-resources may access them from anywhere and at any time. Thus their queries, difficulties, and information needs must be addressed irrespective of their geographical location. The core essence of embedded librarianship also demands that. The library should be in a position to attend them instantly without compromising on personal assistance. This becomes more imperative when it has a direct implication on the utilization of library resources (both print and online) and user satisfaction. However, the study of the related literature does not indicate the prevalence of VRS in Indian libraries.

The absence of a systematic study may cause uncertainty leading to discouragement amongst the library professionals who are willing to commence VRS in their libraries but are not able to do so in absence of concrete recommendations regarding the algorithm and choice of software. The area of concern includes missing an effective and useful platform for connecting with their user community. The research gap concerning library professionals point of view, user perception, technological possibilities were needed to be addressed and resolved. VRS wherever available, supplements and complements traditional reference service (TRS). As the existing research knowledge base is lacking relevant studies on the practical aspects of VRS implementation especially, using a free solution, the scope of improvement exists for converting the challenges into opportunities.

Thus, in the light of the above facts the present study “Librarians’ Perception Towards Virtual Reference Service (VRS) Implementation” has been planned by the researcher as a meaningful understanding and deliberate investigation pertaining to the domain of VRS.

Rationale of the Study:

The rationale of the study is formed out of the author's reason or justification based on “gaps in the literature” or “what are the open questions of the study” for undertaking the research in the first place with the emphasis on “why it is important to address those gaps”. According to Drummer & Bassed (2013) “The rationale often explains which specific groups of people can benefit from the research and it typically indicates how the specific project fits within the developing body of knowledge.” When describing the rationale, researchers are obliged to consider the importance of their work and the implications it has. As Carroll (2013) asserts, “Researchers should also examine what impact the study might have not just on the academic or scientific community but also on the public and additionally on how it will impact lives or the environment.”

In the current e-centric world and changing user information needs and information seeking behaviour (ISB), the demand for online information services is growing day by day. The biggest issue is how the libraries are responding to this paradigm shift. It has become imperative to critically assess the perception, perspective and attitudes of the library and information professionals and users regarding VRS.

Although, the environment in which the libraries are serving their users, has changed drastically as indicated by the adoption of ICTs in the libraries, yet there no such change is visible in the methods of providing reference service. The queries and difficulties of the users visiting the library physically are addressed at the reference desk, while there is a lack of provision in extending this service to those who are not visiting the libraries physically but are in the need of timely help. In this context, a systematic study to identify the determinants of the non-existence of VRS as indicated by the findings of an online survey undertaken on libraries of the CRIKC institutions. The need for such study is also established by the fact that VRS is a missing phenomenon in Indian libraries, except for a few cases, libraries are providing an asynchronous virtual reference (AVR) through email and web-form. In contrast, the literature suggests VRS is a well-established phenomenon in libraries of many countries. Therefore, it is pertinent to know, why such service, which has the potential to maximize the usage of library resources, enhance the footfall and visibility of libraries, is missing from Indian libraries.

Significance of the study

The findings and suggestions of the study will benefit the libraries, library users who want online assistance to be provided, and the institutions engaged in teaching, learning and research. The study will provide a simple, effective and reliable approach to enable the libraries to implement VRS in standalone libraries that would be equally sustainable for VRS collaboration in a "Reference Consortia". The study will contribute significantly to the field of research undertaken by addressing the statement of the problem.

The results of the study will provide the libraries with information on how improvements and advancements can be brought in the current status of TRS and VRS. The insights derived out of the data analysis will be very useful.

This study will foster new ways of enhancing knowledge, skills and attitude, thus preparing globally competitive libraries in the future. Information collected will help in enriching and extending the current/existing literature in the field of VRS.

The study will help in understanding and assessing the current status of reference service and librarians' perception regarding Virtual Reference Service (VRS). Besides, the study will stimulate future research pertaining to VRS, both by researchers and practising librarians thus helping in the advancement of the body of knowledge (BoK) by completing a set of concepts, terms and activities that make up the professional domain of VRS/DRS.

Research Questions:

The present study revolves around and attempts to investigate the following research questions:

RQ1: What are the basic ICT infrastructures in CRIKC institutions?

RQ2: How many staff are there in CRIKC libraries?

RQ3: What is the current status of basic ICT infrastructure available at the CRIKC libraries?

RQ4: What is the current status of reference service being offered in the CRIKC libraries?

RQ5: How the idea of traditional and virtual reference service (TRS and VRS) is being perceived by the librarians of the CRIKC institutions?

Objectives of the Study

1. To assess the current status of basic ICT infrastructure available at the CRIKC libraries.
2. To ascertain the current state of reference service being offered in the CRIKC member institutions.
3. To investigate the librarians' perception towards traditional and virtual reference service (TRS and VRS)

Scope of the Study:

The scope of the study comprises various facets pertaining to virtual reference service (VRS) and current status of reference service in CRIKC (Chandigarh Region Innovation & Knowledge Cluster) institutions. CRIKC was established on 24th November 2012 and constituted as a cluster of Chandigarh region institutions to promote and sustain excellence in research. CRIKC aims to foster and sustain close academic alliances between institutions of higher education and research in the Chandigarh region. It aims to facilitate innovation and knowledge creation and for achieving excellence in all academic spheres without compromising in any manner the autonomy of the participating institutions.

Universe of the study and Sampling:

The universe consists of all survey elements that qualify for inclusion in the research study. The universe may be individuals, groups of people, organizations, or even objects. In the present study, the universe of the study comprises libraries of select member institutions of Chandigarh Region Innovation & Knowledge Cluster (CRIKC). At the initial stages of my study, there were 20 members of CRIKC. Later, as of June 2019, the number rose to 29 with new members joining the cluster. The population of the present study comprises librarians of select CRIKC institutions. The present study focussed on ascertaining the current status of VRS, the reason for not providing VRS and feasibility of VRS.

Table 1: Select CRIKC member institutions under study

SN	Institution	Place
1.	Panjab University (PU) http://puchd.ac.in/	Chandigarh
2.	Postgraduate Institute of Medical Education & Research (PGIMER) http://pgimer.edu.in/PGIMER_PORTAL/PGIMERPORTAL/home.jsp	Chandigarh
3.	PEC University of Technology http://pec.ac.in/~pecac/new/	Chandigarh
4.	Indian Institute of Science Education & Research (IISER) http://www.iisermohali.ac.in/	Mohali Punjab
5.	Indian Institute of Technology Ropar (IIT Ropar) http://www.iitrpr.ac.in/	Rupnagar Punjab
6.	Institute of Microbial Technology (IMTECH) http://www.imtech.res.in/index.php?option=com_content&view=frontpage&Itemid=1	Chandigarh
7.	National Institute of Pharmaceutical Education and Research (NIPER) http://www.niper.ac.in/	Mohali Punjab
8.	CSIR-Central Scientific Instruments Organization (CSIR-CSIO) http://www.csio.res.in/	Chandigarh
9.	Indian School of Business (ISB) http://www.isb.edu/pgp/campuses/Mohali	Mohali, Punjab
10.	National Agri-Food Biotechnology Institute (NABI) http://www.nabi.res.in/	Mohali, Punjab
11.	National Institute of Technical Teachers Training & Research (NITTR) http://www.nitttrchd.ac.in/sitenew1/	Chandigarh
12.	Terminal Ballistics Research Laboratory (TBRL) Defense Research and Development Organization (DRDO), http://www.drdo.gov.in/drdo/labs/TBRL/English/index.jsp?pg=homebody.jsp	Chandigarh
13.	Government Medical College & Hospital (GMCH) http://gmch.gov.in/	Chandigarh

14.	Chandigarh College Of Engineering & Technology (CCET) http://www.ccet.ac.in/	Chandigarh
15.	Punjab State Council for Science & Technology (PSCST) http://pscst.gov.in/Default.aspx?pagesPSCST=home&mainMenu=Home	Chandigarh
16.	Centre for Development of Advanced Computing (C-DAC) http://www.cdac.in/	Mohali
17.	Institute of Development and Communication (IDC) http://www.idcindia.org/	Chandigarh
18.	Centre for Research in Rural and Industrial Development (CRRID) http://www.crrid.res.in/	Chandigarh
19.	Punjabi University, Patiala http://www.punjabiuniversity.ac.in	Patiala Punjab

Research Methodology:

The research problem investigated by the study was the culmination of several factors including the absence of actual VRS implementation in Indian libraries, especially SVRS, the research gap concerning library professionals point of view & technological possibilities. The research questions of the present study composed of aspects including the current status of reference service, librarians' perceptions pertaining to the feasibility of Virtual Reference Service (VRS), reasons for not initiating VRS in CRICK libraries and ICT infrastructure vis-à-vis VRS.

To gather data for addressing these issues, the quantitative method was found to be appropriate as it facilitates measuring, ranking, categorizing, identifying patterns and making generalizations. The survey method of research was adopted to conduct the study. To conduct the survey, questionnaire method was employed to collect data from librarian/reference librarian/library professionals from the libraries of the select CRIKC institutions. To supplement information the interview method was also employed to collect data as and whenever required. A questionnaire was prepared for library professionals with a view to

understand, describe, interpret, contextualize, and gain in-depth insight pertaining to the research problem and research questions/objectives of the present study from their perspective. Out of 20 CRIKC member institutions (initial phase of data collection), only 19 had well established libraries equipped with library staff except Institute of Nano Science and Technology (INST). Thus, the questionnaire was administered amongst the library professionals of 19 CRIKC institutions. Data pertaining to the library profile, library collection, etc. were collected from the library websites of the select CRIKC libraries. The WebOPACs were also consulted for the cross-verification of relevant data obtained from the respondents. Library annual reports, wherever available, helped in capturing a few data points. The data was then analyzed using statistical software IBM SPSS.

Data analysis and interpretation

Data analysis and interpretation holds a crucial position in the research process. After collection of data with the help of relevant tools and techniques, the next logical step is to analyse and interpret data with a view to arriving at an empirical solution to the problem. The chapter attempts to achieve the objectives as stated earlier to draw relevant conclusions. It deals with detailed analysis and interpretation of data, collected through questionnaire and other means. The data analysis for the present research was done quantitatively with the help of both descriptive statistics and inferential statistics using the software IBM SPSS. The descriptive statistical techniques like mean, standard deviation and for the inferential statistics The Kruskal-Wallis H-test sometimes also called the "One-way analysis of variance (ANOVA) and Chi-square test have been used.

CRIKC institutions and their core disciplines

The universe of the study comprised of select libraries of the member institutions of Chandigarh Region Innovation & Knowledge Cluster (CRIKC). Library professionals from following CRIKC institutions formed the set of respondents. The population of the present study comprised of librarians of select CRIKC institutions. The general information about the CRIKC library is discussed bellow.

Table 2: Core disciplines of CRIKC institutions

SN	Name of the Institutions	Core Discipline	Year of establishment
1	Institute of Development and Communication (IDC)	Social Science	1992
2	Centre for Research in Rural and Industrial Development (CRRID)	Social Science	1978
3	National Institute of Technical Teachers Training & Research (NITTTR)	Engineering & Tech.	1967
4	Government Medical College & Hospital(GMCH32)	Health and medicine	1991
5	Postgraduate Institute of Medical Education & Research (PGIMER)	Health and medicine	1962
6	National Agri-Food Biotechnology Institute (NABI)	Science, Engineering & Tech and Health & medicine	2010
7	Institute of Microbial Technology(IMTECH)	Health and medicine	1984
8	Centre for Development of Advanced Computing (C-DAC)	Engineering & Tech. & Health and medicine	1988
9	Indian Institute of Technology (IIT) Ropar	Engineering & Tech.	2008
10	Chandigarh College of Engineering & Technology (CCET)	Engineering & Tech.	2002
11	The Indian Institutes of Science Education & Research (IISER)	Science	2007
12	Council of Scientific & Industrial Research (CSIR-CSIO)	Science and Engineering & Tech.	1962
13	Punjab State Council for Science & Technology (PSCST)	Science and Engineering & Tech.	1983
14	Punjabi University Patiala	General (Multidisciplinary)	1962
15	Panjab University (PU)	General (Multidisciplinary)	1947
16	National Institute of Pharmaceutical Education and Research(NIPER)	Health & Medicine	1998
17	Punjab Engineering College (PEC)	Engineering & Tech.	1953
18	Indian School of Business (ISB)	Business & I.T	2012
19	Terminal Ballistics Research Laboratory (TBRL) (DRDO)	Armament Studies	1961

Results

The respondents of the varied disciplines may exhibit a wide range of attributes, behaviours, experiences, incidents, qualities, situations, and so forth which facilitates gaining greater insights understanding the variation in librarians' perspectives, ranging from Current Status

of Reference Service, reference collection size, VRS infrastructure and librarians' perception regarding VRS. Table 4.1 and Figure 4.1 reveal that there were two institutions '*IDC'* and *'CRRID'* belonging to the discipline of Social Science and another four institutions '*NITTR', 'IIT Ropar', 'CCET'* and *'PEC'* deal in the discipline of Engineering & Technology and 4 institutions *'GMCH 32', 'PGIMER', 'IMTECH'* and *'NIPER'* belong to Health & Medicine. Disciplines viz. Basic Science, Business and I. T. and Armament Studies are offered by only one institution each i.e. '*IISER', 'ISB'* and *'TBRL'* respectively. Three institutions viz. '*C-DAC (Engineering and Technology. and Health and Medicine), 'CSIR-CSIO'* and *'PSCST' (Science and Engineering & Technology)'* cater to 2 disciplines each. The institution '*NABI'* has three disciplines viz. Science, Engineering & Technology and Health & Medicine. The two institutions namely '*Punjabi University Patiala and Panjab University Chandigarh'* offer teaching and research in the wider range of disciplines (multidisciplinary).

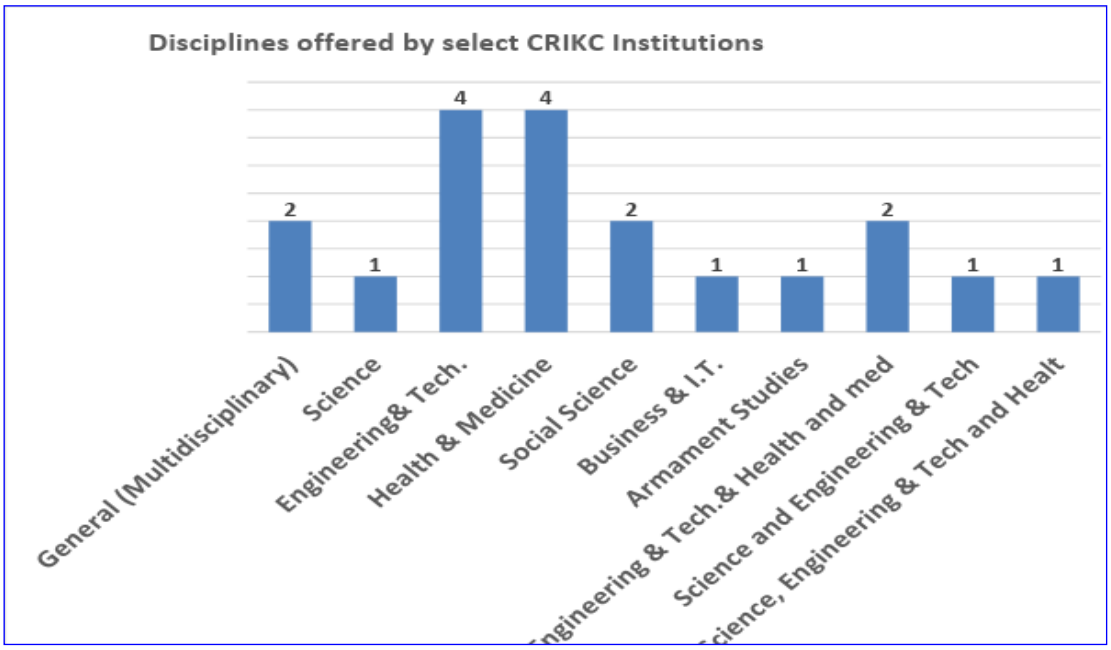

Figure 1: Disciplines offered by select CRIKC institutions

Discussion

It is clear from the above observations that the libraries of the above institutions cater to the need of a heterogeneous user community as CRIKC brings together higher education

institutions belonging to a wide variety of disciplines. This enables the researcher to capture a wide range of perspectives relating to the status of Virtual Reference Service (VRS).

Table 3: Number of staff in the library

No. of staff	Librarian	Deputy Librarian	Assistant Librarian	Library assistant	Doc Officer/Inf. Officer	Para-professional	Library attendant	Clerical Staff
0	11	14	10	10	14	12	9	12
1	8	2	5	3	4	1	4	3
2		1	3	2	1		1	2
3		1		1		1	1	
4		1PU				4		
5								
6							1	2
7						1		
10			1PU					
11				2				
12							1	
17							1	
19							1	
27				1PbU				

Values given above denotes no of libraries

Results

Table 4 above describes the availability of library professionals and other staff in the select CRIKC institutions' libraries. It was noted that 11 libraries had no '*librarian'* and rest of the eight libraries were headed by one librarian each. Fourteen libraries didn't have any '*deputy librarian'* whereas there were 5 libraries having the same ranging from 1 to 4. Ten libraries served their patron without any '*assistant librarian'* while in 5 libraries there were 1 and in 3 libraries there were 2 '*assistant librarians'*. Ten '*assistant librarian'* (the maximum) and 11 '*library assistant'* served at Panjab University library while 27 '*library assistants'* were working at Punjabi University, Patiala. It was also noted that 19 *library attendants* (the maximum) assisted the library professionals at Punjabi University Patiala.

Discussion

Technology-enabled VRS ensures more opportunity, flexibility and mobility in handling reference queries as it offers synchronous as well as the asynchronous mode of communications equipped with ticketing facility for follow up and maintaining communication threads when staff is not available. These facilities allow librarians to take up more queries in less time. Availability of mobile apps also helps in this regard. Moreover, suitability and readiness of VRS tools for collaborative/co-operative VRS lower the hurdles of staff shortage. Thus a fewer staff can manage VRS efficiently and systematically. Volunteers can also join and support the VRS from any location for any fixed duration (like one hour per week) depending upon their area of interest and subject speciality which is not possible in Traditional Reference Service (TRS).

Table 4: Existing infrastructure and manpower available in the library for VRS

	Highly Inadequate n(%)	Inadequate n(%)	Adequate n(%)	Highly Adequate/ Suitable n(%)	Total
Computer	0 (0)	1 (5.3)	6 (31.6)	12 (63.2)	19 (100)
Server	0 (0)	1 (5.3)	6 (31.6)	12 (63.2)	19 (100)
Library automation software	1 (5.3)	0 (0)	6 (31.6)	12 (63.2)	19 (100)
Official cell phone	5 (26.3)	0 (0)	7 (36.8)	7 (36.8)	19 (100)
ICT Trained staff	0 (0)	2 (10.5)	9 (47.4)	8 (42.1)	19 (100)
Internet connection	0 (0)	0 (0)	10 (52.6)	9 (47.4)	19 (100)
Local Area Network (LAN)	0 (0)	0 (0)	10 (52.6)	9 (47.4)	19 (100)
Wi-Fi	1 (5.3)	0 (0)	8 (42.1)	10 (52.6)	19 (100)
Scanner	0 (0)	1 (5.3)	9 (47.4)	9 (47.4)	19 (100)
Printer	0 (0)	0 (0)	10 (52.6)	9 (47.4)	19 (100)
Library web site	1 (5.3)	1 (5.3)	8 (42.1)	9 (47.4)	19 (100)

OPAC	1 (5.3)	2 (10.5)	8 (42.1)	8 (42.1)	19 (100)
VRS Software/Tool	9 (47.4)	9 (47.4)	1 (5.3)	0(0)	19 (100)

Results

Table 4.20 indicates that little more than 60% of the libraries found '*computer',* '*server' and 'library automation software'* highly adequate to serve their patron while little more than thirty percent *(31.6%*) mentioned the adequacy of this infrastructure. It was also found that '*Official cell phone'* (73.6%), *'ICT Trained staff'* (89.5%)*, 'Internet connection'* (100%)*, 'Local Area Network (LAN)'* (100%), *'Wi-Fi'* (94.8%)*, 'Scanner'* (94.8%), *'Printer'* (100%), '*Library web site'* (89.5%) *, 'OPAC'* (84.2%) were available (highly adequate and adequate) in almost all the libraries. The table also reveals that only in one library '*Library automation software', 'Wi-Fi', 'library website' and 'OPAC'* were highly inadequate. During the period the study was conducted the researcher found that VRS (synchronous) was being provided through free tool namely via 'Tawk.to' in one of the institutions namely Indian Institute of Science Education & Research (IISER), Mohali.

Discussion:

Availability of ICT infrastructure is conducive for Computer-Mediated Environment (CME) which is essential for providing Virtual Reference Service (VRS). It was found from the above table that most of the libraries were having basic ICT infrastructure thus making a case for implementing VRS, (both synchronous and asynchronous) including chat-based reference service. Thus libraries can plan for taking VRS initiatives without significant expenditure towards building ICT infrastructure.

Table 5: Types of Reference and Information services provided in the library

	Very Frequently n(%)	**Frequently n(%)**	**Sometimes/ occasionally n (%)**	**Rarely n(%)**	**Never n(%)**	**Total**	**Mean**	**Rank**
Quick/Ready	6	9	2	2	0	19	4.0	R_2

reference and other directional services	(31.6)	(47.4)	(10.5)	(10.5)	(0)	(100)		
Information and Referral services	3 (15.8)	11 (57.9)	2 (10.5)	3 (15.8)	0 (0)	19 (100)	3.7	R_3
Inter Library Loan	3 (15.8)	8 (42.1)	2 (10.5)	6 (31.6)	0 (0)	19 (100)	3.4	R_6
Document Delivery	3 (15.8)	3 (15.8)	4 (21.1)	2 (10.5)	0 (0)	19 (100)	2.3	R_{11}
Fee- based services	1 (5.3)	1 (5.3)	3 (15.8)	2 (10.5)	12 (63.2)	19 (100)	1.8	R_{13}
Procedural	0 (0)	3 (15.8)	4 (21.1)	4 (21.1)	8 (42.1)	19 (100)	2.1	R_{12}
Long Range Reference Service	2 (10.5)	4 (21.1)	1 (5.3)	4 (21.1)	8 (42.1)	19 (100)	2.4	R_{10}
E-mail alerts	5 (26.3)	8 (42.1)	2 (10.5)	2 (10.5)	2 (10.5)	19 (100)	3.6	R_4
News paper clipping	4 (21.1)	7 (36.8)	4 (21.1)	2 (10.5)	2 (10.5)	19 (100)	3.5	R_5
Electronic clipping	3 (15.8)	6 (31.6)	2 (10.5)	1 (5.3)	7 (36.8)	19 (100)	2.8	R_8
Indexing and abstracting	3 (15.8)	1 (5.3)	5 (26.3)	3 (15.8)	7 (36.8)	19 (100)	2.5	R_9
SDI	5 (26.3)	4 (21.1)	3 (15.8)	1 (5.3)	6 (31.6)	19 (100)	3.1	R_7
Display of new arrivals	8 (42.1)	10 (52.6)	1 (5.3)	0 (0)	0 (0)	19 (100)	4.4	R_1

Results

A question was asked to the librarians of select CRIKC institutions regarding types of Reference and Information Services (RISS) provided in their respective libraries. As per the responses received the data was tabulated. Table 4.13 makes it clear that the highest response (57.9%) for "*information and referral services"* was provided 'Frequently' while 15.8% provided this service 'very frequently'. '*Display of new arrivals'* (94.7%) and *'quick/ready reference and other directional services'* (79%) were provided regularly ('Very Frequently' and 'Frequently') by the majority of CRIKC institutional libraries. It is evident from the table that display of new arrival was the most prominent service with mean score 4.4 and Rank 1. '*Quick/Ready reference service'* (79. %) and '*information and referral services'* (73.7%) were also in higher side with mean score 4.0 (R2) and 3.7 (R3) respectively. '*E-mail alerts'* (68.4%) and '*long-range reference service'* (57.9%) were regularly (frequently and very frequently) provided by the CRIKC libraries with mean score 3.5 (R4) and 3.4 (R5) respectively. '*Inter-Library Loan'* (57.9%) and '*SDI'* (47.4%) were also regularly provided by a little less than 60% and little less than half of the libraries respectively. About 74% librarian opined that they never facilitated '*Fee-based services'* in their libraries while 42.1% libraries never offered '*Procedural'* and *'Long Range Reference Service'* to their patron.

Discussion

CRIKC libraries were providing either traditional desk-based in-person reference service or by asynchronous mode of VRS like Email. So, there exists a great opportunity for CRIKC libraries to initiate VRS at their campuses. VRS not only extend the scope of TRS in terms of time and space but also enriches its quality through value-added services. VRS not only just provide the information sought but also takes the users one step ahead towards the completion of the task at hand. For example user is unaware of the procedure of Document Delivery Service (DDS)/Inter Library Loan (ILL), may reach the reference desk to know the procedure and come back to initiate action to his/her end, whereas in case of VRS, the reference staff may fill the online DDS/ILL request form on behalf of the user or send the link of DDS/ILL request form to enable the users to make a successful request then and there.

Through VRS, libraries can provide both directional as well as procedural assistance with the additional facilities by presenting before the user relevant information products and services matching the context of the question. To fulfil the discipline-specific in-depth research queries, libraries may need to engage in resource sharing and networking which can be facilitated by VRS more easily and effectively than TRS as the VRS tools and software have been appropriately designed to work in consortia environment. Generally, libraries do not maintain statistics regarding reference queries owing to the paucity of time whereas in case of VRS the chat transcript provides highly valuable insight which is otherwise tacit in nature. The statistical report generated within a click of button not only streamlines the service but also provides a realistic reflection on the library services. Such reports provide useful information regarding the level of user satisfaction towards the library holding thus facilitating the streamlining of Collection Development Policy (CDP).

Table 6: Instruction based services provided by the library

	Very Frequently n(%)	**Frequently n(%)**	**Sometimes/ occasionally n(%)**	**Rarely n(%)**	**Never n(%)**	**Total**	**Mean**	**Rank**
One to one instruction	7 (36.8)	2 (10.5)	7 (36.8)	2 (10.5)	1 (5.3)	19 (100)	3.6	R3
Group instruction	2 (10.5)	7 (36.8)	5 (26.3)	1 (5.3)	4 (21.1	19 (100)	3.1	R5
Orientation tours	1 (5.3)	9 (47.4)	7 (36.8)	1 (5.3)	1 (5.3)	19 (100)	3.4	R4
Induction sessions	2 (10.5)	3 (15.8)	4 (21.1)	4 (21.1)	6 (31.6)	19 (100)	2.5	R10
Information literacy sessions	2 (10.5)	3 (15.8)	5 (26.3)	4 (21.1)	5 (26.3)	19 (100)	2.6	R8
Printed guides and handouts	2 (10.5)	5 (26.3)	4 (21.1)	2 (10.5)	6 (31.6)	19 (100)	2.7	R7
Audiovisual	2	5	5	3	4	19	2.9	R6

presentations	(10.5)	(26.3)	(26.3)	(15.8)	(21.1)	(100)		
Web-based guides and handouts	2 (10.5)	5 (26.3)	2 (10.5)	4 (21.1)	6 (31.6)	19 (100)	2.6	R8
Course-integrated instructions	1 (5.3)	3 (15.8)	6 (31.6)	3 (15.8)	6 (31.6)	19 (100)	2.5	R11
Database/e-resources Mediated searching	5(26.3)	10(52.6)	1(5.3)	1(5.3)	2 (10.5)	19 (100)	3.8	R2
Access/searching OPAC	10 (52.6)	6 (31.6)	1 (5.3)	0 (0)	2 (10.5)	19 (100)	4.2	R1

Results

Table 7 reveals the preference of instruction based services provided by the libraries of select CRIKC institutions. It was found that the highest response (52.6%) for '*access or searching OPAC'* was in 'very frequently' provided category while 31.6% provided this service 'frequently'. The mean score for this was 4.2 holding the highest rank. Little more than fifty percent (52.6%) of the librarians opined '*database/e-resources mediated searching'* were provided frequently while 26.3% responded that they provided this service very frequently with mean score 3.8(R2), followed by '*one to one instruction*' (47.3%)with mean score 3.6 (R3). '*Orientation tour' (52.7%)* and *'group instruction'* (47.3%) offered by the select libraries occupied Rank 4 with mean score 3.4 and Rank 5 with mean-score 3.1 respectively. Other instructions based services provided by select CRIKC institution libraries were '*audiovisual presentation', 'printed guides and handouts', 'web-based guides and handouts', 'information literacy sessions' and 'course-integrated instructions'* ranging from R6 to R11 with no sharp difference in their mean score ranging from 2.9 to 2.5

Discussion

Instruction based services are very useful services assisting the users in searching, locating, finding, evaluating and using information with least effort. This facilitates better use of library resources, as they can be put to maximum utilization. The table/result reveals that all the libraries under study were providing instruction based services by and large. OPAC serves as a gateway to the library collection and resources providing users with real-time information about the availability of the same. It becomes handier as users can access OPAC through their mobile devices 24/7 with the additional facilities of reserving documents and mobile alerts. This service is offered by 16 of the select libraries frequently or very frequently. Instructions given to the users regarding accessing or searching OPAC enhances their search capability with effective search strategies making the collection more discoverable. As libraries are subscribing more and more e-resources including online databases the need for mediated searching is gaining importance. Librarian mediated database searching is a very effective way to introduce the various features of the database including search mechanism and managing the retrieve results so that users can harness maximum benefit out of it as an independent learner.

Table 7: Guidance given to the library patron

	Very Frequently n(%)	**Frequently n(%)**	**Sometimes/ occasionally n(%)**	**Rarely n(%)**	**Never n(%)**	**Total**	**Mean**	**Rank**
Reader's advisory services	3 (15.8)	4 (21.1)	4 (21.1)	3 (15.8)	5 (26.3)	19 (100)	2.8	R2
Research assistance and consultation	4 (21.1)	9 (47.4)	2 (10.5)	3 (15.8)	1 (5.3)	19 (100)	3.6	R1

Results

Table above reveals that '*research assistance and consultation'* was actively provided by 21.1% (4) libraries very frequently, however, this service was frequently provided by

47.4% (9) and 10.5% (2) libraries sometimes assisted the researcher. About 15.8% (3) seemed disinterested in this service as they rarely engaged in providing such a service. '*Readers advisory services'* (57.9%) were also provided by regularly (frequently and very frequently) by the librarian of CRIKC institution libraries while 26.3% opined that they never offered this service. It was evident from the analysis of data presented in above table that research assistance and consultation were widely adopted with mean score 3.6 and Rank 1 and '*reader's advisory services'* was also provided by the libraries of CRIKC institutions with mean score 2.8 (R2). It can be noted that greater emphasis was given to '*research assistance and consultation'*. The population under study was more research-centric.

Discussion

Research assistance and consultation provide one to one high-quality depth research-oriented assistance for the qualitative improvement, enriching and value addition to the research process. Library Research Support (LRS) goes a long way towards improving the research profile of the institution. The above data reflects that CRIKC member libraries are actively engaged in research assistance and consultation catering to the research environment which is quite appreciable. They are also providing readers' advisory service which is essential for introducing the users with library collection, services and other facilities.

Table 8: Strategies/methods adopted for creating awareness amongst users regarding Reference Service offered by the library

Strategies for creating awareness regarding Reference Service	**Frequency**	**Percentage**
Guidance	2	10.5
Library website, User education programme, Guidance, Library's promotional activities	7	36.8
Library website, Guidance	2	10.5
Library website, User education programme, Guidance	2	10.5

User education programme, Guidance	2	10.5
Library website, User education programme, Library's promotional activities	1	5.3
Library website, User education programme, Guidance	2	10.5
Total	19	100

Results

Table 3 reveals that 10.5% libraries adopted only '*guidance',* to make the user aware of reference service while another 10.5% libraries gave priority to '*Library website and Guidance',* another 10.5% actively involved in *'Library website, User education programme and Guidance',* there were libraries (10.5%) who preferred *'User education programme and Guidance'* to create awareness amongst the users. Four of the strategies namely *'Library website, User education programme and Guidance'* were adopted only by 10.5% libraries. However, 36.8% (7) of the select libraries were using all the strategies '*Library website, 'User education programme', 'Guidance' and 'Library's promotional activities'* to create awareness among the user regarding reference service offered by the libraries of CRIKC institutions.

Discussion

It is evident from the above table that libraries under study were using one or the other method for marketing information of reference service offered by them. Websites information reference was considered to be effective ways of creating awareness amongst users.

Table 9: Mode of reference services

Mode of reference services	**Yes n(%)**	**No n(%)**	**Total**
Face -to-face consultation	19	0	19

	(100)	(0)	(100)
Through telephone	10 (52.6)	9 (47.4)	19 (100)
Online Ref Service (E-mail and Webform)	16 (84.3)	3 (15.8)	19 (100)

Results

The table above presents the various modes of reference service adopted by the libraries of select CRIKC institutions. As expected, it was found that (100%) of the libraries were providing '*face to face consultation'* (traditional reference service). About 84.3% of the libraries were providing '*online reference service (E-mail and Webform)'* and 52.6% used '*telephonic method'* for providing reference service.

Discussion

It is quite satisfactory to note that 84.3% of the libraries actively engaged in providing online reference service. However, after discussion with the librarians it was found that libraries were not maintaining reference related statistics, if maintained (monthly, quarterly or yearly) would have lead to understand the user needs and problem faced by them in a better way thus streamlining the reference service. Reference statistics could become a part of the Library Annual Report. The scenario, in case of VRS/DRS the reference statistics are captured and stored for further analysis and facilitates building and enriching searchable and browsable FAQ database.

Table 10: Librarians' perception regarding various types of reference service

	Traditional reference Desk n(%)	**VRS n(%)**	**No Impact n(%)**	**Total**
Quick/Ready reference questions	4	10	5	19

	(21.1)	(52.6)	(26.3)	(100)
Detailed, research questions	6 (31.6)	8 (42.1)	5 (26.3)	19 (100)
Reader's advisory questions	10 (52.6)	4 (21.1)	5 (26.3)	19 (100)
Directional questions	7 (36.8)	8 (42.1)	4 (21.1)	19 (100)
Procedural questions	8 (42.1)	7 (36.8)	4 (21.1)	19 (100)

Results

Table 11 depicts librarians' perception regarding the preference of Traditional Reference Service (TRS) over Virtual Reference Service (VRS) and vice versa. It indicates that more than 50% librarians pointed out that '*quick/ready reference questions'* can be better handled by Virtual Reference Service (VRS) than TRS. As per the librarians of 42.1% (8) CRIKC institutional libraries, '*detailed research questions'* as well as '*directional questions'* are more effectively answered through VRS than TRS. However, in the case of '*readers advisory questions'* librarians of 52.6% (10) institutions opined that TRS would be a more effective method than VRS. As per the perception of 42.1% (8) librarians TRS considered more effective over VRS while dealing with procedural questions.

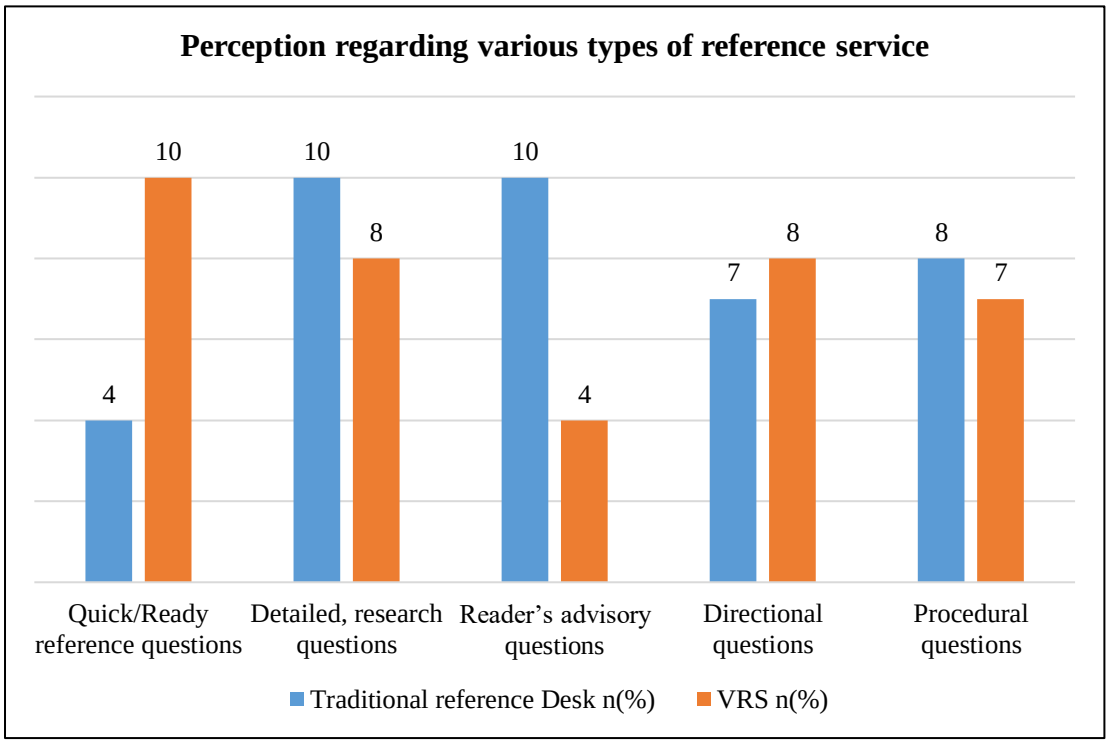

Figure 4.14: Perception regarding various types of reference service

Discussion

As per librarians' perception, Quick/Ready reference service, as well as Long Range reference service along with research questions, could be managed more effectively and efficiently through VRS than it could be provided through traditional reference desk. This perception comes along with the belief that VRS can play a major role and add value to the existing reference Service model. Also, the positive response towards VRS reflected here corroborates with the findings of Table discussed earlier.

Conclusion: Virtual Reference Service (VRS) should be used to make users aware of the library services and the library as a place. Through the innovative and instant communication tools, used in VRS, the reference librarians should portray the value and worth of the library among the users. Users can only realize the benefits and importance of synchronous mode of VRS once the users get an opportunity to avail the same for extended hours. Users will obviously be inclined towards the synchronous mode of VRS for instant and immediate information delivery satisfying their information need.

The study founded a positive perception regarding the adoption and acceptance of virtual

reference service by the librarians of CRIKC libraries.Library professionals consider VRS to be a useful and valuable service. The study of several proprietary as-well-as free solutions also revealed unlikelihood of huge investment towards VRS infrastructure requisition. The minimum requirement of reliable and secure Internet connectivity is already available with the libraries/institutions. Additionally, the plurality of Campus-wide WiFi facilitates Internet access on-the-fly diminishing the location limitations.

These facts contemplate the existence of a conducive and approbative environment for the successful and sustainable implementation of VRS in a single or multiple library conglomerate like CRIKC. The only financial obligation which the institutions/libraries to be met would arise in case of opting for proprietary or commercial VRS solution in the form of the subscription cost.

The study evaluated some free online communication tools and identified a functional, multi-featured and free tool, namely tawk.to. It was highly customizable and appropriate for establishing a Synchronous Virtual Reference Service (SVRS). Tawk.to can meet the VRS requirements of cooperative and collaborative environments quite effectively. It is the quintessential tool with the potential to enhance resource usage through timely and quality assistance leading to user satisfaction.

Although the present study is limited in its scope as far as the sample size is concerned still this study is significant for librarians and libraries. The conclusions of the present research study can be used libraries to develop innovative reference service strategies for making the information-seeking process more effective and user-centred. It is hoped that the research studies in this area will provide for notable contributions in the future. Envisaging VRS for CRIKC libraries will unquestionably equip and empower the libraries to provide the users with the desired information pin-pointedly, exhaustively and expeditiously as articulated by Dr. S R Ranganathan.

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